LOWER MANHATTAN PEOPLE MOVER STUDY

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Preliminary Report

LOWER MANHATTAN PEOPLE MOVER STUDY

prepared under a grant from the
Downtown-Lower Manhattan Association by

Vollmer Associates

in cooperation with
The Mayor's Office of Lower Manhattan Development and

The Department of City Planning, Division of
Transportation and Regional Planning

July 1, 1971

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Introduction: Summary of Conclusions

This preliminary report is based on three months of study jointly undertaken by Vollmer Associates and the City. It establishes a striking need for a local transit system in lower Manhattan. We recommend that the study be continued under a contract with the M.T.A. and, with their support, be submitted to Washington for federal funding.

Assumptions

- By 1980 the work force of lower Manhattan will be approaching 600,000 and the residential population 125,000
- The people mover system will be free
- 90% of the right-of-way will be built on publicly-owned land (East River Development, Battery Park, Battery Park City, Washington Market, Civic Center)

Conclusions

- A 5¢ fare if imposed, would carry an annual maintenance, operating and replacement cost of $3 million.
- Peak loads would approach 30,000 people per hour (lunch time 26,000)
- The initial capital cost of the system would be $48 million
- The system should be operated by a private or semi-private corporation funded by the downtown community.

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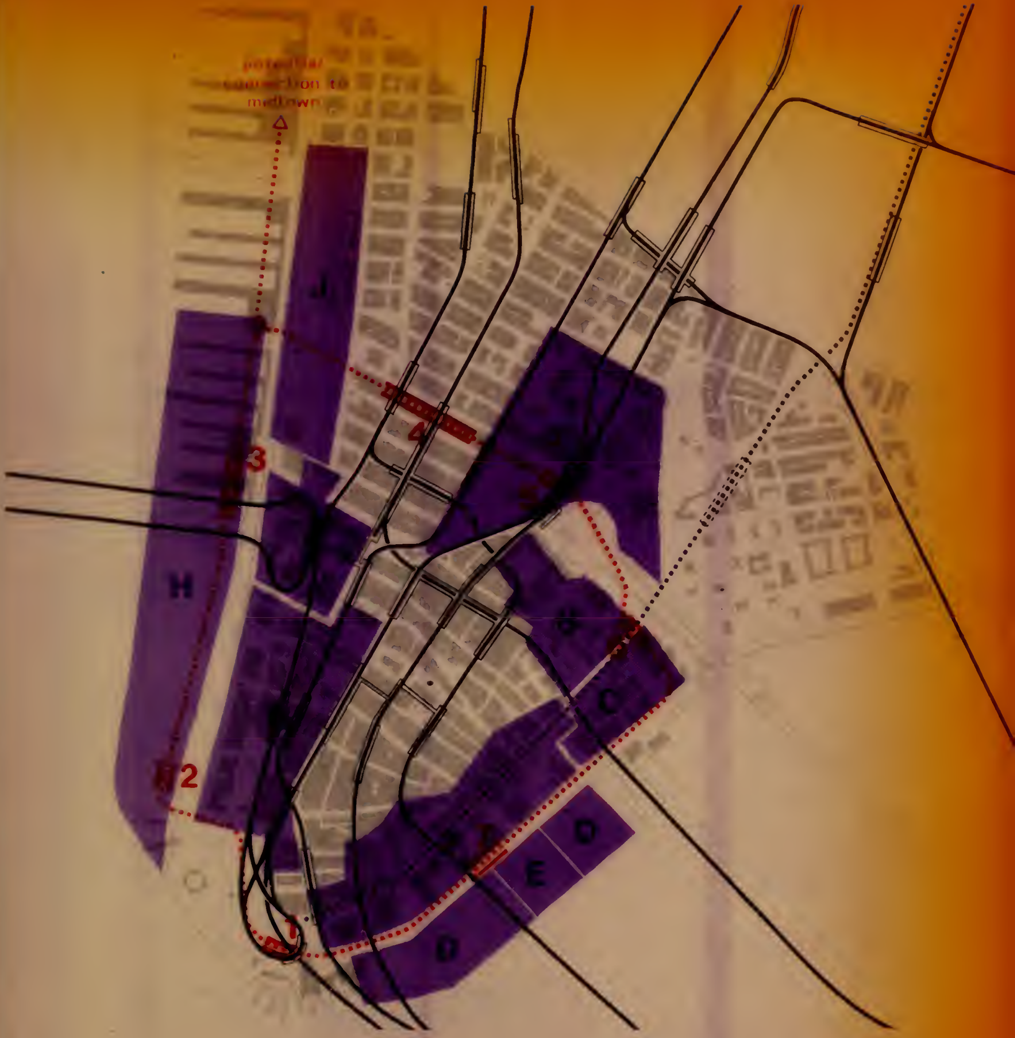
Urban Design and Network Alternatives

The loop configuration for the people mover (see Map 1) while having many advantages, fails to tap the dense core of the financial district. Therefore, two cross-island connectors, one on Liberty Street and one on Fulton Street, were examined. In both cases, underground routes appear to be unfeasible because of the position of subway and utility lines and elevated systems appear to have serious environmental problems due to the close proximity of existing buildings as well as difficulty in accommodating large elevated stations to carry heavy passenger loads. A network of underground moving sidewalks connecting subway mezzanines suggests a more likely means of moving people from the core out to the loop.

While no in-depth study or cost analysis for these alternatives was feasible within the scope of this study, phase two should consider them in detail.

Demand

Preliminary estimates of maximum and minimum demand were made to determine the characteristics of the system required. The estimate of maximum demand assumed that all commercial office space available in 1980 would be filled; that 120,000 persons would live in lower Manhattan; that the people mover system would provide service at least the equivalent to an alternative subway trip in terms of speed, comfort, accessibility and transferability; that there would be a marked



LOWER MANHATTAN – SUBWAYS – DEVELOPMENT AREAS – PEOPLE MOVER

A – Civic Center
B – Brooklyn Bridge Southwest Urban Renewal Area
C – South Street Seaport
D – East River Development Area
E – Stock Exchange
F – Special Water Street Development District
G – Special Greenwich Street Development District
H – Battery Park City
I – World Trade Center
J – Washington Market Urban Renewal Area

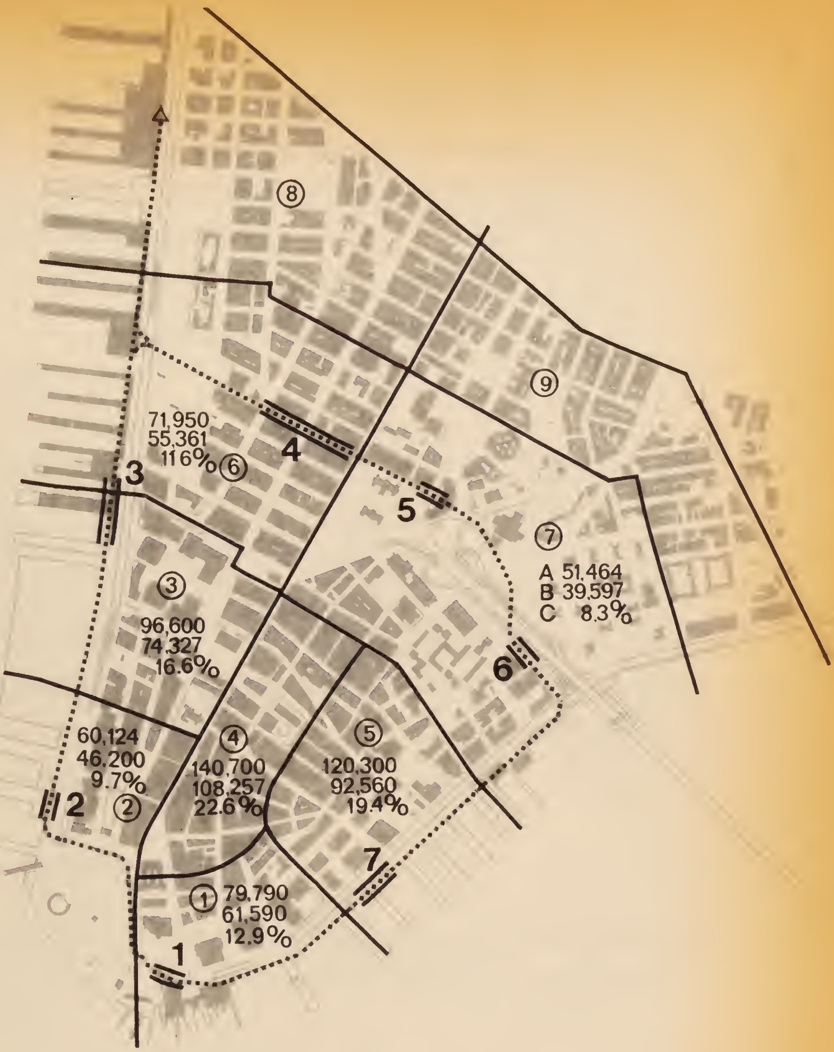
increase in retail space; and, most importantly, that no fare would be charged. The estimate of maximum demand is given in the table below. Minimum demand was taken as 20% of those loads.

People Mover Traffic Estimates (1980)

Total Populations		Daily Riders Diverted to People Mover (1 way trips)
Journey to Work-Home (1980 labor force = 620,000)		
Subway	330,000 riders	64,800
Ferry	25,500 "	20,800
Path	21,700 "	22,000
Residential*	39,000 "	30,000
Visitor and Work Related		
Major Attractions**	185,000	185,000
Misc. Business	264,000	116,200
Miscellaneous		
Lunch Related	496,000	48,200
Off-Hours Misc. 6pm to 8am	-------	66,500
Total Daily Trips Diverted to People Mover System		553,500
Total Annual Rides on the System		156 million

* Labor force living in lower Manhattan
** Includes 15,000 recreational visitors

Station to station demand on an hourly basis was then determined and used as an input to a network assignment and cost model developed to support this project. This data combined with data on the operating characteristics of the various types of people mover systems permitted



LOWER MANHATTAN WORK FORCE – 1980

A – Total Work Force
B – Subway Commuters
C – % of Area Work Force to Total Work Force

the computer to determine the maximum passenger loads on each link of the system and to determine the capital and operating costs to run the system. Operating cost elements of the systems are covered in the following sections.

People Mover System Specifications

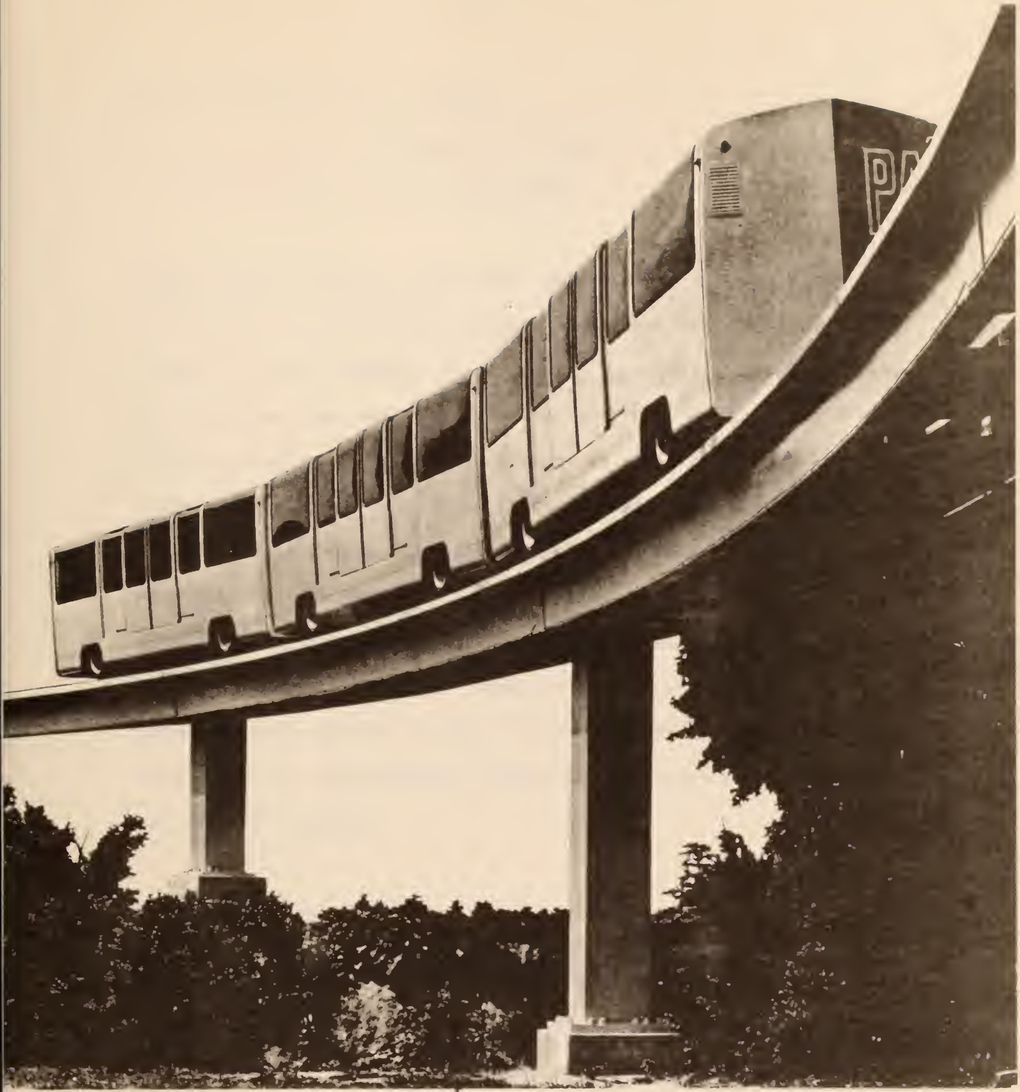
Definition

People movers belong to a class of public transportation systems designed for internal circulation in Central Business Districts and for short distance travel between points of major activity. Generally, these systems require their own private right-of-way; use small, separate vehicles (some types can be assembled into trains); are electrically powered; are designed for automatic, driverless operation; and can carry from 5,000 - 20,000 passengers per hour, depending upon vehicle and train headways.

System Types and Reliability

The study team has reviewed the specifications of a number of systems, most of which are in the prototype development and testing stages. They were:

1. Westinghouse "Skybus"
2. Dashaveyor
3. Alden "Starcar"
4. Transportation Tech. "Hovair"
5. Varo "Monocab"



Westinghouse "SKYBUS" Transit Expressway

System Specifications

Seats/car	28	Headways	10-30 sec.
Cars/train	4-8	Guideway	rigid mono beam
Capacity-pass/hr.	30,000	Stations	on line
Power	565 volt, 3 phase AC		

6. "Transeat"
7. Goodyear "Carveyor"
8. Otis "Travelator"

These systems and their performance characteristics have all been evaluated in our cost and operations model, but only the Westinghouse "Skybus" is being operated in commercial service (at the Tampa Airport) and meets our load requirements. The other manufacturers are presently testing prototypical full-scale systems on their own test tracks. Areas such as Dallas-Fort Worth Airport; Morgantown, Virginia; and Dulles Airport International Transportation Show are contracting for people mover type systems. The completion of these programs will permit us to test the feasibility of many new systems which are to date operationally untested. Areas which need evaluation include: automatic train control and centralized computer system reliability, maintenance of close headways between trains, operational reliability and customer response.

Environmental Impacts

Most of the reviewed systems are capable of meeting today's more restrictive standards for air pollution, noise and ride quality. Elevated structures and guideways could be integrated with building complexes, e.g. Battery Park City and the East River Development.

System Performance

Assuming a free system, hourly rates of flow on the system varied from 500 passengers during the evening hours, 10 p.m. - 8 a.m., to 27,000 in the peak 5:20 - 6:00 p.m. period. This compares to peak loads of 40-50,000 passengers on the subway system. It was found that only the fixed schedule type of system similar to the "Westinghouse SKYBUS" had sufficient capacity to satisfy the peak period demand requirements at the "optimistic" load levels. Demand remains high throughout the day because of large visitor and lunch-time crowds producing an average of 15,000 passengers per hour between 12 - 3:00 p.m.

Costs

The mathematical model that was used to evaluate system operating characteristics also provided the means to quickly estimate capital and operating costs under various systems and loads. Costs were estimated after a thorough review of all literature available from manufacturers, independent studies by U.S. Department of Transportation consultants and accepted cost estimating procedures.

A circumferential system, similar to the SKYBUS Transit Expressway be Westinghouse, operating as a four-car train on a fixed schedule, with stops at all seven stations, and including yard and shop facilities and automatic control and passenger surveillance was estimated to cost $47.6 million in 1971 dollars. This includes $10 million for subway alterations in the Chambers Street corridor. Exclusive of

right-of-way costs, which have been assumed to come free since most of the land and air rights are under public control, the elevated portion of the system was assumed to cost $8-10 million per mile.

Capital and operating costs for this system (SKYBUS) were also estimated for lower load levels as shown on the chart below.

Annual People Mover Costs

Demand	Capital*	O&M**	Total	Annual Ridership	COST/RIDE
100%	$3.881m	$2.503m	$6.384m	156 million	4.1¢
50%	$3.389m	$2.090m	$5.479m	92 "	6.0¢
20%***	-	-	-	31 "	12-15¢
50% in peak period	$3.664m	$2.371m	$6.035m	138 "	4.4¢

* Capital costs amortized at the following equipment lives @ 7% interest:

guideway and equipment	50 years
electronics	20 years
cars	15 years

** includes $750,000 per year to replace cars

*** data not yet available

It is interesting to note that passenger costs per ride do not rise greatly as demand is reduced to 50%, and that a 50% reduction in peak period traffic only slightly increases rider costs.

Recent conversations with Kaiser Industries and the Port Authority suggest a more conservative cost analysis; however, the discussion was of a preliminary and tentative nature and will be pursued in the coming months.

Financial and Development Implications

An important national precedent would be established if the Downtown Community could find a way to finance the operation and maintenance of its own local transportation system. The corporation created for this purpose might be privately operated or include the participation of government agencies; it could be funded by an assessment district or through some form of voluntary subscription. We recommend that the D.L.M.A. undertake a study of the feasibility and proper formulation of the concept. It is clear that such a precedent would be of enormous interest to City, State and particularly Federal officials and would be an important factor in attracting capital funds.

It is generally recognized that the future of lower Manhattan depends on the conversion of the area into a twenty-four hour community through the increased development of housing. The convenience of a free, pleasant means of local travel adjacent to the housing would be an important incentive for residential as well as commercial growth. The cultural, commercial and recreational life of the community will be located on the waterfront and directly accessible to the people mover. These amenities should help to create an attractive, modern business environment and insure the growth and stability of the community.